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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.    | CONFIRMATION NO. |
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| 09/653,281      | 08/31/2000  | Kevin L. Beaman      | M4065.0278/P27899-0818 | 4745             |

7590

03/21/2003

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EXAMINER

BOOTH, RICHARD A

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 03/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/653,281

Applicant(s)

BEAMAN ET AL.

Examiner

Richard A. Booth

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-16,18,21-31 and 34-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-16,18,21-31 and 34-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3-11-03 has been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6-16, 18, 21-31, and 34-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al., U.S. Patent 6,376,309 in view of Hoff et al., "Atomic Oxygen and the thermal oxidation of silicon" or Ruzylo et al., "Evaluation of Thin Oxides Grown by the Atomic Oxygen Afterglow Method".

Wang et al. shows the invention as claimed including forming a tunnel oxide 404 on a substrate 402; forming a first conductor 406 over the tunnel oxide 404; forming an insulating layer 410 over the first conductor layer, the insulating layer comprising a first oxide layer over the first conductor layer, a nitride layer over the first oxide layer, and a

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second oxide layer over the nitride layer, wherein the second oxide layer is formed by oxidizing said nitride layer with an ambient containing atomic oxygen to a thickness of fifty angstroms (see column 3, lines 39-54); forming a second conductor layer 412 over the insulating layer; etching at least the first conductor layer, the second conductor layer, and the insulating layer, thereby defining at least one stacked structure (see Figure 3).

Note with regard to claims 6, 21, and 36, the hydrogen and oxygen present when forming the second oxide layer will react to form steam.

Wang et al. fails to show forming the second oxide layer using an oxidizing ambient in atomic oxygen to form the oxide layer with a thickness of 60% of a targeted thickness and at various temperatures and times.

Both Hoff et al., "Atomic Oxygen and the thermal oxidation of silicon" and Ruzyllo et al., "Evaluation of Thin Oxides Grown by the Atomic Oxygen Afterglow Method" disclose forming an oxide layer in a microwave environment using an oxidizing method with atomic oxygen (see abstracts of both methods). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Wang et al. so as to form the second oxide layer using the process taught by Hoff et al. or Ruzyllo et al. because both of these processes allow for oxide growth at low temperatures with high breakdown values.

With respect to the particular time and temperature of the oxidation, it would have been obvious to determine through routine experimentation the optimum time and temperature to conduct the oxidation process based upon a variety of factors including

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the desired thermal budget and would not lend patentability to the instant application absent the showing of unexpected results.

### ***Response to Arguments***

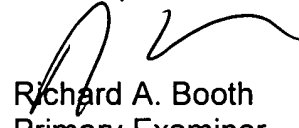
Applicant's arguments with respect to claims 1-3, 6-16, 18, 21-31, and 34-45 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is 308-3446. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are 308-7724 for regular communications and 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-1782.

  
Richard A. Booth  
Primary Examiner  
Art Unit 2812

March 18, 2003